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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/813,629

03/31/2004

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EXAMINER

NGUYEN, DILINH P

ART UNIT

PAPER NUMBER

2814

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/813,629	Applicant(s) USUI ET AL.	
	Examiner DILINH NGUYEN	Art Unit 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 11, 15, 16 and 29-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 11, 15, 16 and 29-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>1/14/08, 3/11/08</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Remark

The translation of Foreign Priority Application (JAPAN 2003-093324) has been filed on 3/25/2008. Therefore, the effective filing date for present application is 3/31/2003. However, a Final rejection is made by the amendment filed on 03/10/08 as set forth in this Office Action. Claims 1-5, 11, 15-16 and 29-35 are pending in the application.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5, 11, 15-16 and 29-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaneshiro et al. (JP 10-284648) in view of Pechenik et al. (U.S. Pat. 5147446).

Regarding claims 1, 15, 29 and 34, Kaneshiro et al. disclose a semiconductor module comprising:

- an insulating base material 5A provided with a conductor circuit;
- a semiconductor element 7 formed on the insulating base material; and
- an insulator 12 disposed in contact with the insulating base material and the semiconductor element;

wherein the insulating base material 5A is provided with minute projections on a surface thereof (the surface of the solder resist film is roughened) (paragraph 0012) is in contact with the insulator 12 (fig. 2 and abstract). The surface of the solder resist film is roughened (paragraph 0012); thus, there are plurality of recesses for projections on the surface of the base material 5A.

Kaneshiro et al. do not explicitly disclose that the projections have 1 nm to 20 nm in average diameter and formed in number density of not less than $0.5 \times 10^3 \mu\text{m}^{-2}$.

However, Pechenik et al. disclose a device structure comprising: a plurality of particles ranging in size from 1.0 to 50 nm (column 1, lines 16-17) and formed in number density from about 60 to 100% of full density (column 4, lines 37-39).

As Pechenik et al. disclose, one of ordinary skill in the art would have been motivated to have a plurality of nanoparticles ranging in size from 1.0 to 50 nm and forming in number density from about 60 to 100% of full density in order to provide a method of fabricating dense, nearly ideally package compacts of nano-sized particles for the device structure.

Therefore, it would have been obvious to one having ordinary in the art at the time the invention was made to modify the device of Kaneshiro et al. by having a plurality of nanoparticles ranging in size from 1.0 to 50 nm and forming in number density from about 60 to 100% of full density as taught by Pechenik et al. in order to provide a method of fabricating dense, nearly ideally package compacts of nano-sized particles for the device structure.

It is noted that the process limitation: "...forming recesses on the insulating base material..." does not carry weight in a claim drawn to structure.

Initially, and with respect to claims 1-5, 11 and 15-16, note that a "product by process" claim is directed to the product *per se*, no matter how actually made. See In re Thorpe et al., 227 USPQ 964 (CAFC, 1985) and the related case law cited therein which makes it clear that it is the final product *per se* which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. As stated in Thorpe,

Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself, *In re Brown*, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972); *In re Pilkington*, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969); *Buono v. Yankee Maid Dress Corp.*, 77 F. 2d 274, 279. 26 USPQ 57, 61 (2d. Cir, 1935).

Regarding claims 2 and 30, Kaneshiro et al. disclose that the insulator 12 is a sealing resin for sealing the semiconductor element therein (fig. 2, abstract, line 19).

Regarding claims 3 and 31, Kaneshiro et al. disclose that the insulator is an adhesive provided between the semiconductor element and the insulating base material (fig. 2).

Regarding claims 4-5, 16 and 32-33, Kaneshiro et al. disclose that the plasma treatment is performed on the insulating layer to form the unevenness on the surface of the insulating layer or to roughen the surface. This shows that, by ensuring that

arithmetic mean roughness of the surface of the insulating base material 5A is $\leq 0.2 \mu\text{m}$ or desirably, $\leq 0.4 \mu\text{m}$, adhesion between the insulating base material 5A and the sealed body 12 is enhanced (paragraphs 0033 and 0035). Therefore, a surface of the insulating base material 5A of Kaneshiro et al. would have a plurality of shaped recesses that is in contact with the insulator 12 (fig. 2). Kaneshiro et al. disclose the claimed invention except for crater-shaped recesses. It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a plurality of crater-shaped recesses. A change in shape is generally recognized as being within the level of ordinary skill in the art. In re Rose, 105 USPQ 237 (CCPA 1955).

Regarding claims 11 and 35, Kaneshiro et al. disclose that the semiconductor element 7 is a bare chip and the insulator 12 is constituted essentially of a sealing resin for sealing the bare chip 7 therein (fig. 2).

Response to Arguments

Applicant's arguments filed 3/10/2008 have been fully considered but they are not persuasive.

The applicant argues that the prior art of record (Kaneshiro et al.) do not disclose the step of forming projections and recesses on the insulating base material.

Applicant's arguments have been fully considered but they are not persuasive because Kaneshiro et al. disclose that the insulating base material 5A is provided with minute projections on a surface thereof (the surface of the solder resist film is roughened) (paragraph 0012) is in contact with the insulator 12 (fig. 2 and abstract).

The surface of the solder resist film is roughened (paragraph 0012); thus, there is plurality of recesses for projections on the surface of the base material 5A.

Therefore, Kanshiro et al. in view of Pechenik et al. disclose all the limitations as required by currently amended claims 1 and 15.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DILINH NGUYEN whose telephone number is (571)272-1712. The examiner can normally be reached on 8:00AM - 5:00PM (M-F).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

DLN

6/8/2008

/Theresa T. Doan/
Primary Examiner, Art Unit 2814